

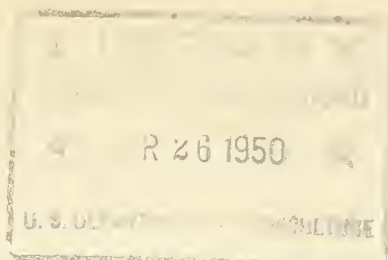
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NEW FROZEN PUREES FROM CITRUS FRUITS

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## NEW FROZEN PUREES FROM CITRUS FRUITS

Frozen fruit and berry purees, for use in frozen desserts, baked goods, and other foods, have been in commercial production since 1937. Citrus fruits, however, have not been included in the long list of products frozen, largely because the opinion has prevailed that they are too strongly flavored and do not keep well in storage. Until recently it was generally believed that such products would develop a "terpeny" off-flavor because of the high oil content resulting from the use of whole fruit in the pureeing process. Several experimental packs of orange and lemon purees were put up by the Laboratory of Fruit and Vegetable Chemistry in Los Angeles, California, during the season of 1947, and after a year's storage at 0°F. it was concluded that frozen citrus purees did not develop unsatisfactory flavors if properly prepared. Commercial production of these purees was started shortly thereafter with immediate success.

### Preparation, Packaging, and Freezing

The processing method developed for the preparation of frozen citrus purees is a comparatively simple but effective means of retaining color and flavor in the finished product. Sound, mature fruit is first thoroughly washed, preferably with a good detergent, and rinsed well with cold water so as to reduce microbial contamination to a minimum. Next, the stem end of the fruit is cut off and other discolored spots removed, so that no dark specks will be mixed in with the bright-colored puree. If Navel oranges are used, the "navel" end should first be cut off.

After the whole fruit has been trimmed, it can be either crushed through a machine, such as an apricot pitter, or quartered. The crushed or quartered fruit is then reduced to a puree by passage through a mechanically driven screening device with minimum incorporation of air into the product. Screen openings of 0.027 to 0.044 inch in diameter can be used, depending on how the puree is to be used. Screen sizes of 0.027 and 0.033 are preferable when purees are intended for sherbets, ices, pies, and beverages, while larger sizes are better for purees intended for marmalades, jams and cake or sundae toppings. The yield of puree from the whole fruit is approximately 50 to 60 percent, and it should contain 0.65 to 0.75 percent of peel oil. With some lots of fruit, the peel oil content of the puree may be considerably higher, and too strong for most purposes. In such cases, the oil content of the puree can be controlled if various proportions of the fresh fruit are passed through an abrasive machine to remove most of the oil sacs or flavedo.

After a puree of the required oil content is obtained, it is next run into a stainless-steel tank and dry sugar is gradually added with thorough mixing in the proportion of 5 parts of puree to 1 part sugar. The sweetened puree is then filled into tin containers of 1 to 2.5 gallons in capacity, hermetically sealed or closed with slip tops, and the contents are frozen in an air-blast freezer at sub-zero temperatures. The filled containers are stored at temperatures of 0 to -10°F. The puree can be frozen more rapidly if first it is run through some type of heat exchanger and filled into containers in the form of a frozen slush. The high-acid citrus purees are preferably packaged in lacquered or enameled cans.



### Advantages of the Method

The freezing preservation of citrus-fruit purees has proved to be a highly efficient and economical method for the preparation of fruit bases possessing natural flavors, color, and nutritive value. These fruit bases can be kept in good condition at 0°F. for more than a year, and with very little, if any, loss of the original vitamin C. content. The pureeing of citrus fruits possesses two distinct advantages. First, sugar added to the puree dissolves in the juice and comes in intimate contact with the fruit cells, which are surrounded by a coating of sirup. Second, the product thus prepared forms a solid mass after freezing, which helps to exclude air. The frozen puree can be defrosted, some of it used, and the rest re-frozen without injury to color and flavor, provided it is not exposed to the air for long periods and the temperature of the product is not allowed to rise too high.

If a fruit-processing plant includes the freezing preservation of citrus purees, its operating season can be extended over longer periods. For example, the fruit-freezing plants in Southern California shut down after the last fruit crops have been harvested. They can continue their operations by freezing citrus purees up to November, using California Valencias, and even later in the season, using Arizona Valencias and Arizona "Sweets." Lemons can be processed in almost any month during the year. The pureeing of citrus fruits for freezing preservation has a distinct advantage for the grower, since fruit having good color and flavor can be utilized regardless of its shape, size, or superficial blemishes which make it unfit for the fresh market. Such a method may aid in utilizing a larger percentage of the citrus crop than is now experienced.

Navel oranges have never been successfully used for the processing of citrus products, since this orange variety contains substances which turn bitter after the juice has been extracted. It has been found that Washington Navel oranges can be pureed, frozen and held for several months at subzero temperatures without any noticeable evidence of the characteristic bitter flavor. Frozen Navel orange purees and sherbets made from the puree have been successfully prepared on a commercial scale. However, on prolonged storage there is a tendency for these purees to jell, and experiments are now under way to study the causes of this jelling and to work out means of preventing it.

### Uses of Citrus Purees

Both orange and lemon purees have been successfully used in the commercial preparation of milk sherbets and water ices. However, taste tests have indicated that the milk sherbets, which contain approximately 2.5 percent butterfat, have a more pleasing flavor and texture than the water ices. In the sherbets and ices made from citrus purees, minute pieces of the orange and lemon peel are detectable, which provide visual evidence to the consumer that the products were flavored with natural fruits.

A number of formulas are available for the preparation of citrus-flavored milk sherbets. Perhaps the easiest method is to obtain a sherbet mix from a dairy products manufacturer, add the proper amount of citrus puree, and freeze in an

ice cream freezer, preferably a mechanically driven type. The better milk sherbet mixes will have the following approximate composition:

Butter fat - - - - - 2.5 percent  
 Milk solids - - - - - 2.5 percent  
 Sugar - - - - - 25.0 percent  
 Stabilizer, such as gelatin or other types  
 Citric acid (50 percent solution), to give  
 a characteristic tartness  
 Coloring dye, to give a bright orange or  
 yellow color to the frozen product

To make orange sherbet with ready-prepared mix, add 14 to 18 ounces of the 5-to-1 puree and 1.5 ounces of the 50 percent citric acid solution to 1 gallon of the mix, stir thoroughly, freeze with a 50 to 65 percent overrun, fill into containers, and harden. Since the lemon puree is more strongly flavored than the orange, smaller quantities are used, for example 10 to 14 ounces of puree plus 0.5 ounce of the 50 percent citric acid solution per gallon of mix. If a sherbet mix is not obtainable, a regular ice cream mix can be used with equally good success, although it will be necessary to add water to reduce the butterfat content to 2.5 percent. Higher butterfat content tends to mask the delicate citrus flavor. In either case, to prevent curdling, the citric acid (as a 50 percent solution) should not be added until just before freezing.

The lemon puree is particularly useful as a flavor base for lemon pies. Pies made from lemon puree have been judged superior in flavor to those made from lemon concentrate or lemon juice. The following recipes containing frozen lemon and orange purees were worked out for commercial use by Mrs. S. M. Douglas in the U. S. Department of Agriculture cafeteria in Washington D. C.:

Abbreviations: T. = tablespoon      qt. = quart  
                   t. = teaspoon        gal. = gallon  
                   c. = cup            pt. = pint

#### Lemon Meringue Pie

(Ten 9-inch pies--1 lb. 2 oz. filling in each pie)

	<u>Lb.</u>	<u>Oz.</u>	
Cornstarch	1	-	
Cold water	-	-	2 qt.
Hot water	-	-	2 qt.
Granulated sugar	4	8	
Salt	-	-	1 T. 1 t.
Lemon puree (frozen)	-	-	1 qt.
Egg yolks	1	4	(30)
Butter	-	10	

Dissolve starch in cold water. Stir this solution into hot water. Cook 15 minutes, stirring constantly. Add sugar and salt. When dissolved, add puree. Blend small amount of hot mixture with yolks. Stir this mixture into remainder of hot mixture. Add butter and keep at boiling point until butter is well blended. It may then be poured into baked shells, or into flat steel pans. Cover with waxed paper when cold. Place in refrigerator until pies are to be used. Then cover with meringue and brown slowly.

### Meringue

	<u>Lb.</u>	<u>Oz.</u>	
Egg whites	1	12	(30)
Granulated sugar	1	1/4	(1 qt.)
Salt	-	-	1/4 t.
Cornstarch	-	-	1 t.

Beat whites, adding sugar, salt, and cornstarch (sifted together) slowly. Beat till meringue forms a wet peak. Spread over filling. Bake in 350°F. oven about 20 minutes.

### Lemon Chiffon Pie (Ten 9-inch pies--1 lb. filling in each pie)

	<u>Lb.</u>	<u>Oz.</u>	
Lemon puree (frozen)	-	-	1 qt. 1 1/4 c.
Granulated sugar	3	12	
Salt	-	-	2 t.
Egg yolks	1	12	(2-3/4 c.)
Plain gelatin	-	2-3/4	
Cold water	-	-	2 1/2 c.
Egg whites	2	8	(1 qt. 1 c.)
Granulated sugar	1	4	(2 1/2 c.)
Yellow coloring			1/4 t.

Heat puree, sugar, and salt to boiling point. Stir yolks into hot mixture. Add gelatin dissolved in cold water (Do not boil.) Chill this mixture over crushed ice to consistency of jelly. Fold in beaten egg whites to which second sugar and coloring have been added. Pour into baked pie shells. Allow to chill in refrigerator at least 2 hours before serving. May be garnished with whip and cream before serving.

### Orange Chiffon Pie (Ten 9-inch pies--1 lb. filling in each pie)

	<u>Lb.</u>	<u>Oz.</u>	
Orange puree (frozen)	-	-	6 1/2 c.
Lemon puree (frozen)	-	-	1 1/4 c.
Granulated sugar	3	-	
Salt	-	-	2 t.
Egg yolks	1	14	
Plain gelatin	-	3-3/4	
Cold water	-	-	3 c. 2 T.
Egg whites	3	2	
Granulated sugar	1	-	



Heat both purees. Add sugar and salt. Beat in yolks. Keep just below boiling point. Stir in gelatin that has been sprinkled over cold water and has been left standing at least 5 minutes. (Do not boil.) When thoroughly dissolved, chill mixture over crushed ice to consistency of jelly. Fold in beaten egg whites to which second sugar has been added. Pour into baked shells. Chill at least 2 hours before serving. May be garnished with whipped cream before serving. Little yellow coloring may be added to egg whites if yolks are very pale.

Lemon Snow Pudding  
(50 servings--4-oz. cups)

	<u>Lb.</u>	<u>Oz.</u>	
Granulated sugar	2	-	
Hot water	-	-	3 c.
Salt	-	-	2/3 t.
Lemon puree, (frozen)	-	-	1 pt.
Plain gelatin	-	2	(6½ T.)
Cold water	-	-	1-2/3 c.
Egg whites	-	12	(12)

Dissolve sugar and salt in boiling water. Add puree. Sprinkle gelatin over cold water. Allow to stand at least 5 minutes. Add this to hot mixture. When thoroughly dissolved, chill over crushed ice to consistency of jelly. Beat in mixer with whip until it holds its shape. Then add egg whites and continue beating until the mixture is light and fluffy like meringue. Fill molds which have been dipped in cold water. Chill in refrigerator at least 2 hours (overnight is better). Turn out and serve with custard sauce.

Grape Nuts Pudding  
(50 servings-- 3 oz. each)

	<u>Lb.</u>	<u>Oz.</u>	
Butter	-	8	
Granulated sugar	2	4	
Egg yolks	-	10½	(16)
Bread flour	-	8	
Salt	-	-	1/2 t.
Grape Nuts	-	10	
Sweet milk	-	-	1 gal.
Lemon puree (frozen)	-	-	2½ c.
Egg whites	1	-	

Cream butter and sugar. Add yolks, flour, salt, and Grape Nuts. Blend well. Add milk and mix. Then add puree slowly. Last, fold in beaten egg whites (not too stiff). Pour into buttered pans. Bake like custard over hot water in 350°F. oven about 45 minutes.

# Orange Cake (3 lbs., 10 oz. batter)

	<u>Lb.</u>	<u>Oz.</u>	
Butter	-	4	
Butter substitute	-	4	
Granulated sugar	-	14	
Eggs	-	-	(4)
Cake flour	1	-	
Baking powder	-	-	1 T., 1 t.
Orange puree (frozen)	-	-	1 c.
Lemon puree (frozen)	-	-	1/3 c.
Yellow coloring	-	-	1/2 t.
Sweet milk	-	-	1/3 c.
Salt	-	-	1/2 t.

Cream sugar and shortening. Add eggs and beat. Add sifted flour and baking powder alternately with purees and coloring. When well blended, add milk to which salt has been added.

May be used for layers, cups, or loaf or tube cakes. Bake cup cakes in 375°F. oven about 15-18 minutes; layers in 360°F. oven about 20 minutes; loaf or tube in 350°F. oven 45-50 minutes.

## Lemon Queen Pudding (50 servings--3-oz. each)

	<u>Lb.</u>	<u>Oz.</u>	
Butter	-	8	
Granulated sugar	3	12	
Salt	-	-	1/2 t.
Bread flour	-	8	
Egg yolks	1	-	(25)
Sweet milk	-	-	2 qt., 3 c.
Lemon puree (frozen)	-	-	2 1/2 c.
Egg whites	1	8	(25)

Cream butter and sugar. Add salt and flour. Blend. Add yolks and milk slowly. Then add puree. Last, fold in beaten whites (not too stiff). Bake in buttered baking dish over hot water in 350°F. oven about 45 minutes until set.

## Lemonade

	<u>Lb.</u>	<u>Qt.</u>
Lemon puree (frozen)	-	1
Granulated sugar	1	-
Hot water	-	1
Cold water	-	4

Pour hot water over sugar. Stir until dissolved. Add cold water and puree. Fill glasses half full of crushed ice and fill with liquid. Makes a very refreshing drink.